

REVISED OCTOBER, 1959

# INSTRUCTION MANUAL

**BENDIX SKIPPER CUSTOM "120"**

## *Bendix* MARINE EQUIPMENT

- **RADAR**
- **RADIO RECEIVERS**
- **RADIO TELEPHONES**
- **DIRECTION FINDERS**
- **DEPTH RECORDERS**
- **DEPTH INDICATORS**
- **AUTOMATIC PILOTS**



8211 LANKERSHIM BOULEVARD  
NORTH HOLLYWOOD, CALIFORNIA

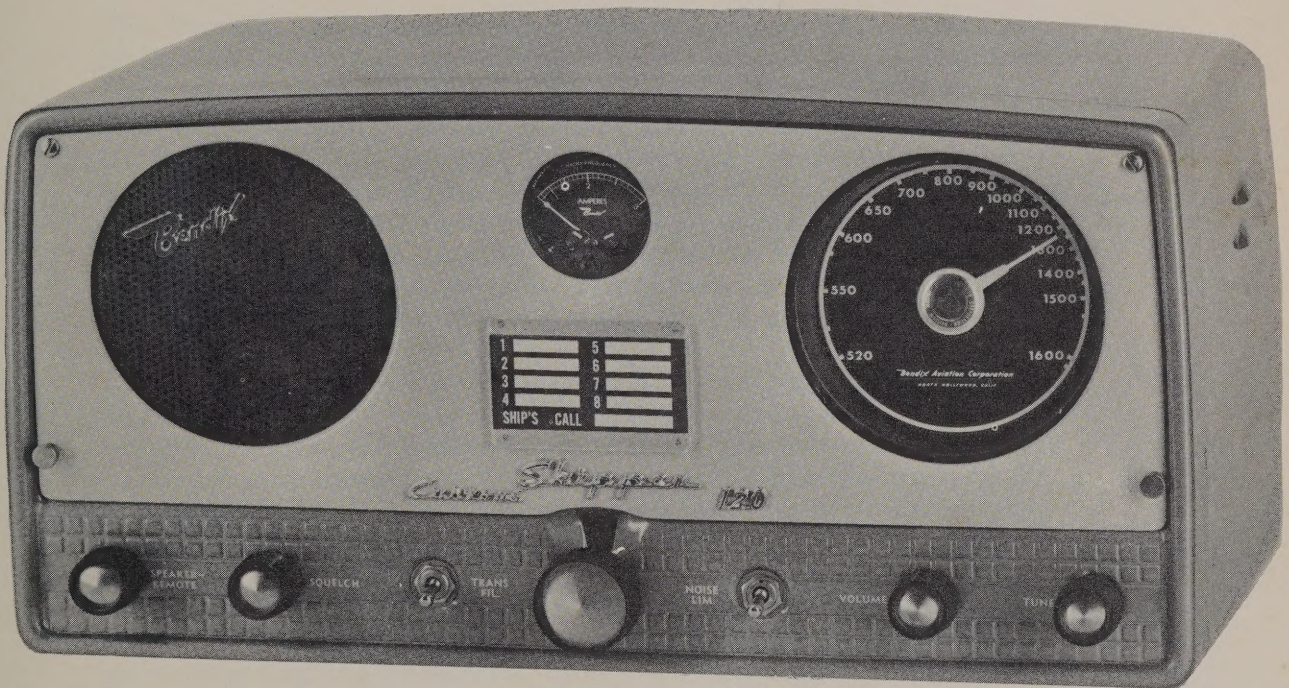




# Service and Instruction Manual

## BENDIX SKIPPER CUSTOM "120" MARINE RADIOTELEPHONE

Transmitter — Receiver



Manufactured By

PACIFIC DIVISION, BENDIX AVIATION CORPORATION

11600 SHERMAN WAY

NORTH HOLLYWOOD, CALIF.





## **BENDIX SKIPPER CUSTOM "120"**

### **WARRANTY**

The Pacific Division, Bendix Aviation Corporation, North Hollywood, California, warrants each new Skipper Custom "120" Radiotelephone to be free from defects in material and workmanship. Its obligation under this warranty being limited to making good at its factory, by repair or replacement, any part or parts with the exception of vacuum tubes and vibrators within six months after installation with the stipulation that the defective material be returned with transportation prepaid and which its examination shall disclose to be to its satisfaction to have been thus defective.

This warranty shall not apply to any radiotelephone which shall have been repaired or altered outside the manufacturer's factory or authorized service station nor which has been subject to misuse, negligence or improper maintenance or accident, nor to have been operated contrary to instructions in this manual.

The Pacific Division, Bendix Aviation Corporation, North Hollywood, California, whose policy is one of continuous improvement of its products, reserves the right to discontinue or change at any time, specifications, design, or prices, without notice and without incurring any obligations.





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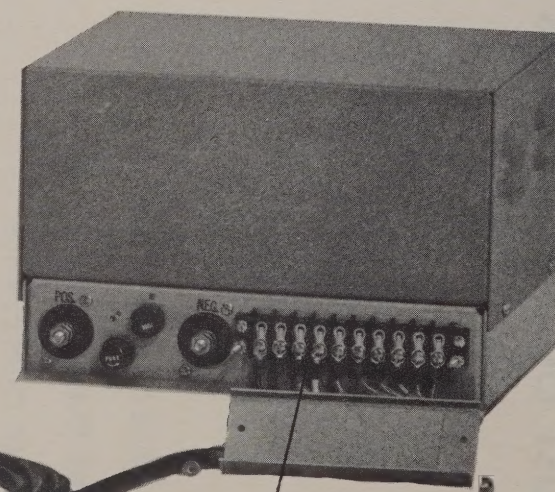
# SKIPPER CUSTOM "120" TRANSMITTER AND RECEIVER

# 1023552



HANDSET  
# 1023631

INTERCONNECTING  
CABLE # 1023621



POWER SUPPLY  
12 VOLT D.C. # 1023593  
32 VOLT D.C. # 1023632  
115 VOLT A.C. # 1023775  
115 VOLT D.C. # 1023633

Figure 1. SKIPPER CUSTOM "120"



# THE SKIPPER CUSTOM "120"

## I INTRODUCTION

### 1. GENERAL DESCRIPTION

The SKIPPER CUSTOM "120" is a combination Radiotelephone transmitter-receiver with eight crystal controlled transmitting and receiving channels and a tunable broadcast receiver. The unit is designed for complete remote control operation when used in conjunction with a remote control unit. The remote control unit is not part of the standard equipment supplied, but may be purchased as an accessory.

Provision is made to use the SKIPPER CUSTOM "120" as a power megaphone system by attaching a remote loudspeaker to the terminals provided on the back of the chassis, and by placing the channel selector switch in the PM position. The complete inter-wiring circuitry of the receiver is assembled on a printed phenoletic board. The receiver is composed of one stage of RF as well as two stages of IF amplification. A noise clipping and squelching circuit provide excellent operating characteristics. The selectivity of the receiver is as sharp as is feasible to obtain satisfactory operation.

The transmitter is capacity coupled through a pi-network to the antenna, and separate variable coupling condensers are provided for each channel; thereby permitting uniform antenna coupling or loading for each frequency utilized. The modulation system has a negative peak clipping or limiting circuit, as well as an audio filter that attenuates all frequencies above 4,000 cycles per second. In this manner, the radiated power is contained in the frequencies adjacent to the carrier frequency.

Each transmitting channel will cover frequencies from 1,600 to 5,000 kc. Each receiving channel is initially set at the factory to cover frequencies from 2,000 to 5,000 kc. The IF frequency of the receiver is 455 kc.

### 2. SPECIFICATIONS AND COMPLIANCE CERTIFICATION

The power input to the final RF amplifier stage is 120 watts when the Radiotelephone is properly tuned and operating on the specified voltage. Measured power into a 12.5 ohm antenna is 75 watts at 2738 kc. The radio carrier will modulate 100% with no cut-off at the negative peaks of the audio.

The SKIPPER CUSTOM "120" complies with all the requirements set forth by the US Federal Communications Commission and the Canadian Department of Transport effective in 1956.

### 3. COMPONENTS (See Figure 1.)

Radiotelephone with attached power supply cable.  
Power Supply Unit.  
Handset with cable.  
Handset hanger.  
Instruction Manual.

### 4. DIMENSIONS AND WEIGHTS

Radiotelephone unit	18" wide, 11-3/4" deep, 9" high
12 and 32 volt DC Power Supply	11" wide, 7-1/2" deep, 8-1/2" high
115 volt AC and 115 volt DC Power Supply	13" wide, 11" deep, 10" high
Net weight of all components	46-1/2 pounds.

### 5. TUBES

1-12BA6	RF Amplifier
1-12BE6	Mixer
2-12BA6	IF Amplifiers
1-12AL5	Detector and Noise Clipper
1-12AX7	Squelch and Audio Amplifier
1-12AQ5	Audio Power Amplifier
2-1625	Modulators
1-12AU7	Crystal Oscillator and Speech Amplifier
1-12AQ5	Buffer Stage
2-6146 or 2-6159	Final Amplifier (P.A.)

#### NOTE

The Final Amplifier (P.A.) tubes 6146 are used in the 12 volt DC and 115 volt AC system. The Final Amplifier (P.A.) tubes 6159 are used in the 32 volt DC and 115 volt DC system.

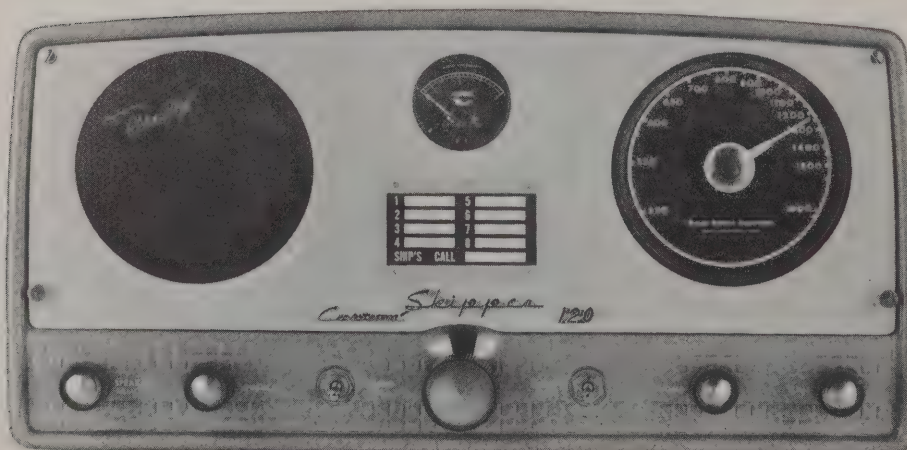


Figure 2. OPERATING CONTROLS



## II OPERATION

### 1. RECEIVING - B C (See Figure 2.)

- a. Broadcast Operation. - Turn the VOLUME control/Power switch on, and place the channel selector switch on BC. Tune in the desired BC station and set the volume control to the desired level.
- b. Remote Speaker - Place the two position SPEAKER-REMOTE switch in the REMOTE position. This will transfer the receiver output from the local speaker to the remote speaker.

### 2. RADIOTELEPHONE OPERATION

- a. Receiving - Turn the VOLUME control/Power switch on, set the volume control to the desired level, and set the channel selector switch to the desired channel.

To reduce static noise, turn the SQUELCH control switch on, and adjust the control until static noise from the receiver drops out. When a signal comes on the air, it will in effect turn the receiver on instantly.

To reduce noise due to electrical interference created by ignition and generation systems aboard vessels, place the NOISE LIM. switch in the up position.

- b. Transmitting - In order to comply with Federal Communications Commission Regulations all calls must be initiated on the international calling frequency of 2182 kc, then transferred to a working frequency after making contact with the vessel or station being called.

Turn the VOLUME control/Power switch on, and adjust to the desired volume. Place the TRANS FIL. switch in the up position, and allow the transmitter filaments to heat for at least 40 seconds. Press the button on the microphone when you wish to talk, and release the button when you wish to listen. The ammeter on the center top of the front panel will indicate antenna current, and its reading should rise when talking into the handset or microphone.

A list of marine frequencies assigned to radiotelephone communications in the United States and Canada appear in Section VII of this book.

#### NOTE

When the transmitter is not in use, such as during long standby periods or when the Radiotelephone is used as a receiver, the TRANS FIL. switch should be off to conserve battery power.

# III INSTALLATION

## 1. LOCATION OF EQUIPMENT

In selecting a location for the SKIPPER CUSTOM "120", the following considerations should apply:

- a. Maximum operating and maintenance accessibility.
- b. Shortest antenna and ground leads.
- c. Reasonable air circulation.
- d. Battery leads should be kept large enough to maintain full input voltage while transmitting.

A separate microphone hanger is provided to allow placement of the microphone in a convenient location. The Radiotelephone and Power Supply should be installed in a protected location. The Power Supply should be located as far from the Radiotelephone as the interconnecting cable will permit.

## 2. RADIOTELEPHONE

The SKIPPER CUSTOM "120" may be removed from its cabinet by unscrewing the front panel thumb screws and pulling the chassis out on the chassis slides. Unscrew the limiting screws that prevent the the removal of the chassis from the slides, and remove the chassis from the cabinet. The cabinet can now be mounted on the four rubber mounts with screws, washers, and nuts provided. It may also be mounted on a table or shelf by inserting appropriate screws in the base of the cabinet and securing to the mounting surface.

The SKIPPER CUSTOM "120" Radiotelephone should be located where due consideration is given to the ground circuit and the location of the antenna. The antenna lead-in should be as short and direct as possible to the transmitter, avoiding long horizontal lead-ins. It must be well insulated since the voltage on some frequencies is relatively high at this point. The Radiotelephone must be coupled to a quarter wave Marconi antenna in which the electrical length of the antenna plus the vertical lead-in from the ground contact is equal to, or less than, one quarter wave length of the highest operating frequency. It is not difficult to obtain quarter wave resonance on these frequencies by using a center loaded antenna similar to the Webster antenna.

A grounding circuit to the vessel's engine is adequate for salt water use, however, occasionally a ground plate on the outside of the ship's hull improves performance. For fresh water operation it is virtually mandatory to have a ground plate on the outside of the hull of not less than ten square feet for maximum performance.

## 3. POWER SUPPLY

If possible, the power supply should be located behind a partition or in a ventilated cabinet so that the slight hum generated by the power supply will not be noticeable.



The SKIPPER CUSTOM "120" Power Supply is available for 12, 32, 115 volt DC, and 115 volt AC operation. The current requirements are as follows:

	<u>12 Volts</u>	<u>32 Volts</u>	<u>115 Volts AC</u>	<u>115 Volts DC</u>
Receiver only	5.5 Amps.	1.8 Amps.	115 watts	5 Amps.
Receiver & Transmitter	8.75 Amps.	3.2 Amps.	140 watts	7 Amps.
Receiver & Transmitter (Transmitter loaded to maximum)	32.5 Amps.	13.75 Amps.	372 watts	10 Amps.

#### NOTE

The minimum and maximum operating voltages for this equipment are from 12-15 volts DC, from 32-38 volts DC, and from 105-120 volts AC or DC.

The leads from the power source should be of sufficient size to carry the current with as little voltage drop as practical. The recommended wire sizes are as follows:

<u>Distance from Battery</u>	<u>12 Volts</u>	<u>32 Volts</u>	<u>115 Volts AC</u>	<u>115 Volts DC</u>
10 feet or less	# 4	# 8	# 14	# 12
10 to 20 feet	# 2	# 6	# 14	# 10
20 to 30 feet	# 0	# 2	# 12	# 8

Connect the Power Supply directly to the ship's generator for 115 volt AC or DC operation, and to the ship's batteries for 12 and 32 volt DC operation using wire sizes listed above. Connection to the ship's AC system is made through the recessed receptacle on the Power Supply. The positive and negative terminals on the 12, 32, and 115 volt DC Power Supplies are clearly marked.

#### 4. ADJUSTMENTS

Before leaving the factory, the SKIPPER CUSTOM "120" is completely tested and inspected on all channels. Proper placement of coil taps on the loading and antenna coils must be accomplished with the individual antenna and ground systems used on the boat. All tuning controls, tubes, etc., mentioned in these instructions are clearly marked on the chassis.

All transmitter adjustments must be made by a holder of at least a Second Class Radiotelephone Operator's license in accordance with Federal Communications Commission Regulations.

The receiver controlling frequency is different from the receiving frequency by 455 kc. To compute the receiver crystal frequency, add 455 kc to those frequencies up to 3,000 kc and subtract 455 kc from those frequencies which lie between 3,000 and 5,000 kc which is the upper limit of the receiver as it is set at the factory. The receiver frequency span may be shifted by adjusting the tuning coils inside the chassis.

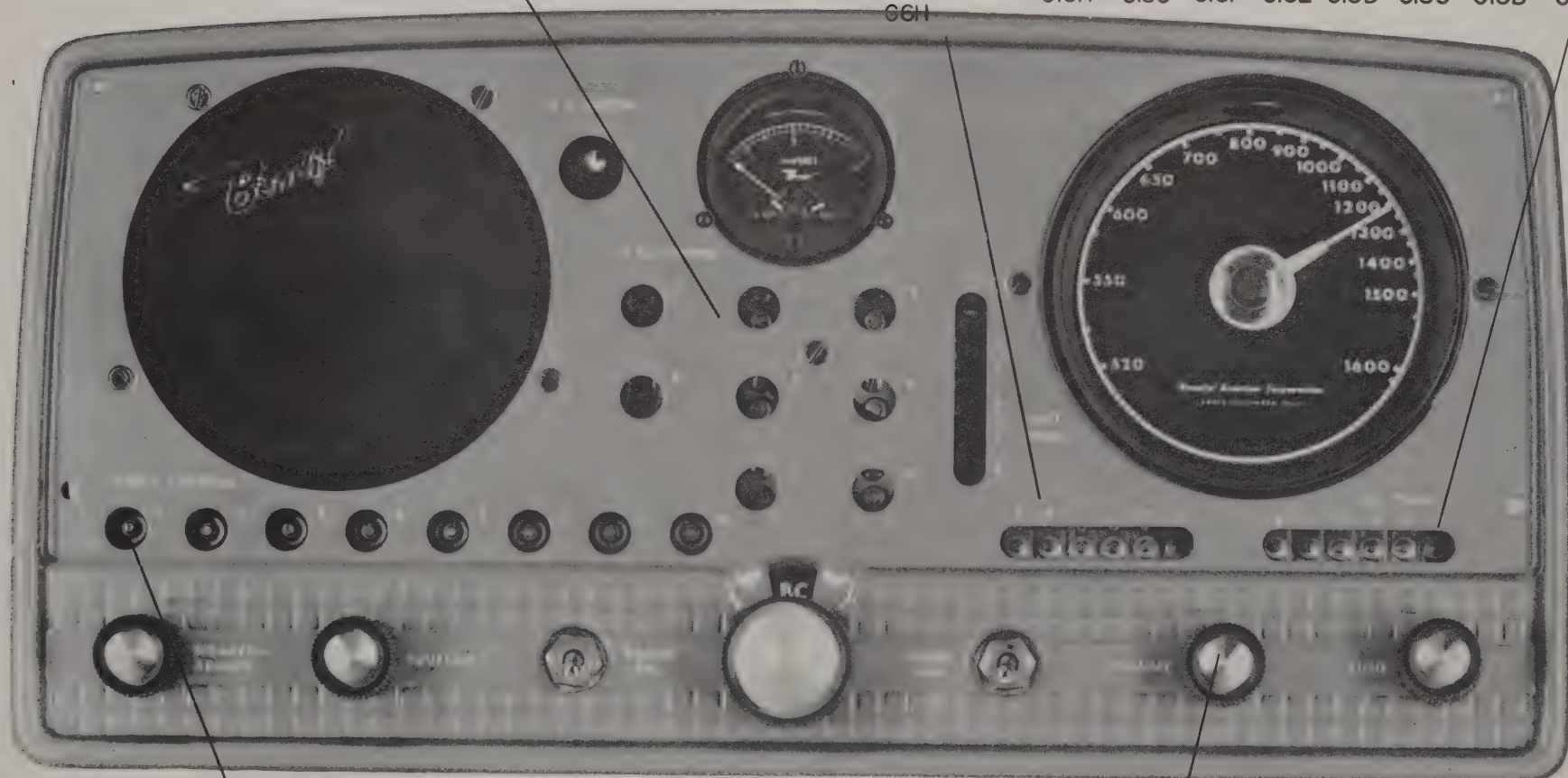
RF POWER AMPLIFIER TUNING CONDENSERS

C58 C57 C56  
C55 C54 C53  
C52 C51

C6A  
C6B  
C6C  
C6D  
C6E  
C6F  
C6G  
C6H

RECEIVER TRIMMERS

C13H C13G C13F C13E C13D C13C C13B C13A



C77 C76 C75 C74 C73 C72 C71 C70  
COUPLING CONDENSERS

POWER SWITCH

Figure 3. ADJUSTMENT CONTROLS



First select crystals at the desired operating frequencies, and place them properly paired in the transmitting and receiving crystal sockets. This equipment is pre-tuned to the following operating frequencies:

Transmitting Frequencies

Channel 1 - 2009 kc  
2 - 2182 kc  
3 - 2110 kc  
4 - 2638 kc  
5 - 2738 kc  
6 - 2830 kc  
7 - 4171.15 kc  
8 - 4447 kc

Receiving Frequencies

Channel 1 - 2566 kc  
2 - 2182 kc  
3 - 2506 kc  
4 - 2638 kc  
5 - 2738 kc  
6 - 2830 kc  
7 - 3666 kc  
8 - 3985 kc

Remove the false front panel (see figure 3) by removing the two screws located on the top corners of the front panel, and the two thumb screws which hold the chassis and front panel assembly in the cabinet.

The adjusting controls or trimmers for the receiver are marked ANT. TRIM and R.F. TRIM. With the channel selector switch set on channel 1, peak the receiver, adjusting controls marked 1, for maximum signal. Repeat the procedure for channels 2 through 8.

To adjust the transmitter, disconnect the antenna and place the channel selector switch on channel 1. Plug in a 0-300 milliammeter in the meter jack marked P.A. METER.

The adjusting controls or trimmers for the transmitter are marked TRANS, LOADING and P.A. TUNING. With the channel selector switch set on channel 1, depress the microphone button and observe the P.A. (power amplifier) current. Adjust the P.A. TUNING control marked 1 for minimum power amplifier current which should be approximately 20 ma. Repeat the procedure for channels 2 through 8.

If the equipment is to be operated on frequencies initially set at the factory, proceed to the adjustments described in the section on antenna loading and coupling. The tank coil clips are color coded in accordance with RMA standards, and normally set for the following frequencies:

Channel 1 - Brown - 2009 kc  
2 - Red - 2182 kc  
3 - Orange - 2110 kc  
4 - Yellow - 2638 kc  
5 - Green - 2738 kc  
6 - Blue - 2830 kc  
7 - Violet - 4171.15 kc  
8 - Grey - 4447 kc

If it is necessary to operate the SKIPPER CUSTOM "120" on frequencies other than those listed above, place the channel selector switch on the proper channel. Insert the correct crystals in the proper sockets on the chassis, as shown in Figure 4, and plug in a 0-300 milliammeter in the meter jack marked P.A. METER. Insert crystals for the lower frequencies in ascending order, in sockets marked 1 through 6,

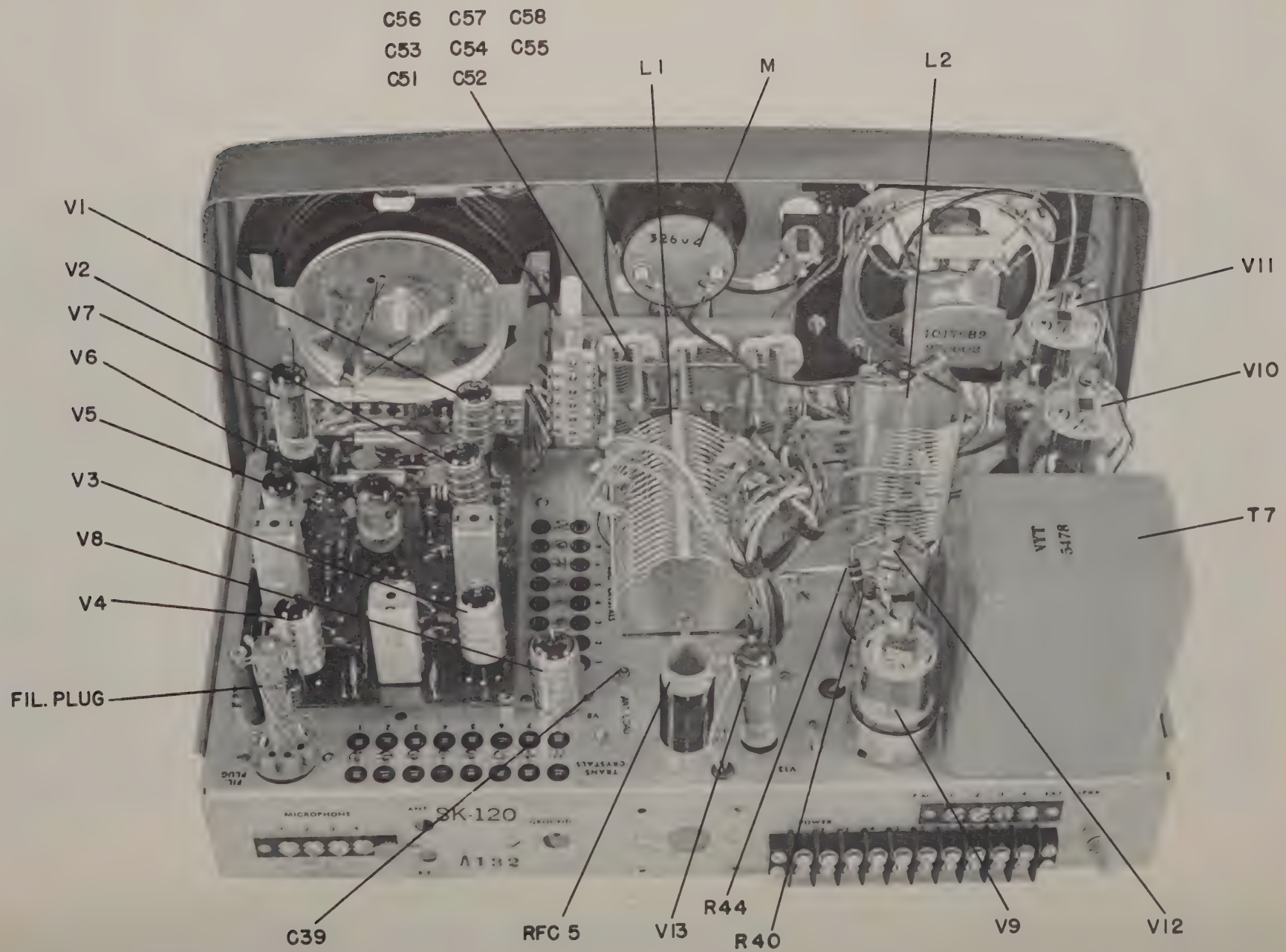


Figure 4. SKIPPER CUSTOM "120" TOP VIEW



reserving 7 and 8 for the higher frequencies. On frequencies higher than 4 mc use channel 7 and 8 exclusively. Proceed as follows:

- Step 1. Set the TRANS. LOADING control, corresponding to the channel selected, to its maximum counter-clockwise setting.
- Step 2. Adjust the P.A. TUNING control so that the capacitor plates are at approximately half capacitance.
- Step 3. Depress the microphone button, and run the proper coil clip from one turn to another along the length of the power amplifier coil, shown in Figure 4, until a minimum current of approximately 20 ma is noted on the P.A. Meter.

#### NOTE

If on the higher frequencies you are unable to resonate the power amplifier, cut the connections between the channel which will not permit this adjustment and the next lower channel on the 6th wafer switch counting from the rear of the chassis, as shown in Figure 8. Repeat the adjustment of the P.A. TUNING control for that channel to get a reading of approximately 20 ma.

- Step 4. When the proper tap has been selected, attach the coil clip and secure in place.

#### CAUTION

Since high R.F. voltages exist in the plate tank circuit extreme care should be used in making these adjustments. Always handle clip leads by the insulated portion of the wire.

- Step 5. Adjust the P.A. TUNING control for the particular channel, for minimum current and check the capacitor plates to be sure that they are not set at either maximum or minimum capacitance.
- Step 6. Repeat the above procedure for any other channel that may require adjustment.

### 5. ANTENNA LOADING AND COUPLING

The following adjustments of the antenna loading coil and coupling condensers shown in figure 4, must be made by a holder of at least a Second Class Radiotelephone Operator's license, in accordance with regulations of the Federal Communications Commission. To tune the antenna for resonance and to set the antenna coupling for the correct power amplifier current, proceed as follows:

- Step 1. With the channel selector switch set on channel 1, plug in a 0-300 milliammeter in the jack marked P.A. METER.
- Step 2. Set all TRANS LOADING controls to the fully counter-clockwise setting.
- Step 3. Run the antenna coil clip from one turn to another up and down the length of the antenna loading coil for maximum R.F. current (0-3 Amperes) as shown on the front panel, and until a maximum current is noted on the milliammeter.
- Step 4. Advance the TRANS. LOADING control until 200 ma is observed on the milliammeter. If the milliammeter does not read 200 ma when the TRANS. LOADING control is adjusted to its maximum clockwise position, turn the TRANS. LOADING control back to its fully counter-clockwise position.
- Step 5. Advance the TRANS. LOADING control from 1/2 to 1 turn in a clockwise direction, then advance the ANT. LOAD control on the chassis until approximately 175 ma is observed on the milliammeter.
- Step 6. Advance the TRANS. LOADING control on the front panel until 200 ma is observed on the milliammeter.

#### NOTE

If during adjustment of any channel, it is necessary to adjust the ANT. LOAD control, reset all TRANS. LOADING controls for 200 ma.

- Step 7. Readjust the P.A. TUNING control for a dip in the milliammeter reading. If this adjustment is in excess of 1/10 turn, the transmitter is overcoupled and should be reduced regardless of the milliammeter reading.
- Step 8. Repeat the procedure for channels 2 through 8.

The SKIPPER CUSTOM "120" is now properly tuned and adjusted. The ammeter on the center top of the front panel will indicate antenna current, and its reading should rise when talking into the microphone. If the panel ammeter does not rise while talking into the microphone, this usually indicates that the transmitter is overloaded and the TRANS. LOADING controls are incorrectly set. Return all TRANS. LOADING controls to their maximum counter-clockwise position and load again for all channels.

If on the higher frequencies you are unable to load the transmitter, cut the connections between the channel which will not permit this adjustment and the next lower channel on the 5th wafer switch counting from the rear of the chassis, as shown in Figure 8. Repeat loading adjustments for these frequencies.



## IV THEORY OF OPERATION

### 1. NOISE LIMITING CIRCUIT

The purpose of a noise limiting circuit in the SKIPPER CUSTOM "120" is to reduce high level, pulse type noise such as ignition interference and crashes of static at the receiver output. The noise limiting circuit in this application is a simple series limiter.

The unmodulated carrier establishes a constant negative DC potential at point A. This voltage is divided across two equal resistors, R-23 and R-26, thereby establishing half the full voltage at the plate of V5B as shown in Figure 5. Since point B is positive with respect to point C, the diode will conduct. However, the potential at point B will change instantly while the voltage at point C will remain at the average level of the detected signal due to the time constant of R-24 and C-27. As a result, the voltage at point B will increase in a negative direction, and, with modulation exceeding 100%, the diode V5B will not conduct. In other words, any noise greater than the 100% modulation peak of the carrier will cut off the diode for the duration of the excess noise level.

### 2. SQUELCH CIRCUIT

When a sensitive receiver which incorporates automatic volume control is being tuned from one signal to another, there is an objectionable increase in noise output. This effect is overcome in the SKIPPER CUSTOM "120" by using a circuit arrangement shown in Figure 6, which will make the receiver silent in the absence of a signal.

A given noise level will establish a certain A.V.C. negative potential at point A. The squelch control, R-25, is then set to allow V6A to conduct. This lowers the positive potential on the grid of V6B, and causes the tetrode to cut off. When a signal is received, the A.V.C. voltage at point A increases and V6A then ceases to conduct. This causes the potential on the grid of V6B to rise in a positive direction thereby allowing it to conduct, and to permit the signals to go through to the audio stage.

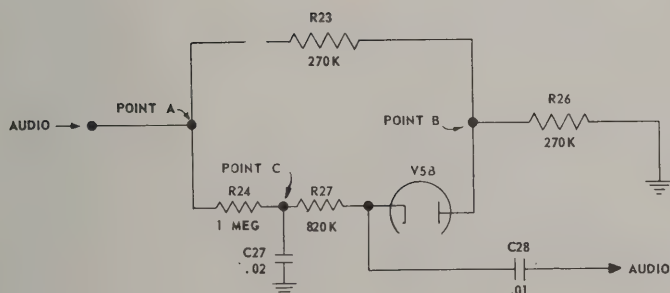


Figure 5. SCHEMATIC DIAGRAM,  
NOISE LIMITING CIRCUIT

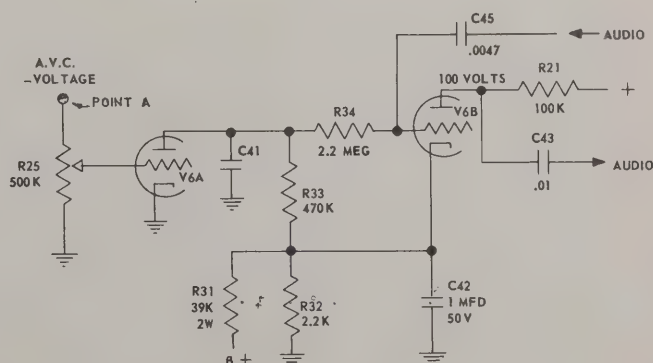


Figure 6. SCHEMATIC DIAGRAM,  
SQUELCH CIRCUIT

## V MAINTENANCE

In case of operational difficulty, the following procedure is recommended:

1. Check fuses in power supply unit.
2. Check power supply cable wiring for pinching or breaks.
3. Check power source and ground connections and cables.
4. Examine antenna connections and antenna itself.

In case the SKIPPER CUSTOM "120" does not receive on BC or any other channel, check the position of the SQUELCH control which may overload the receiving portion of the Radiotelephone when it is set too high. Turn the SQUELCH control to the off position, and readjust for squelch until static noise drops out.

Any other maintenance work will require shop test equipment and the services of a technician thoroughly familiar with the operation of this equipment. The usual procedure is to set up the equipment or unit requiring service, take voltage and current measurements, make continuity tests for shorts or open circuits, etc., and thereby localize the trouble.

The tube heaters in this transmitter are series-parallel connected. For this reason the Power Switch should always be in the OFF position before any tube is removed.

To simulate normal operating conditions for the transmitter, it is recommended that a 200 watt, 10 ohm resistor (Ohmite 0900B) be used in series with a 0-250 mfd variable capacitor of sufficient plate spacing as a dummy antenna as shown in Figure 7.

### NOTE

It does not matter if the resistor is inductive since the dummy antenna is resonated leaving only pure resistance in the circuit.

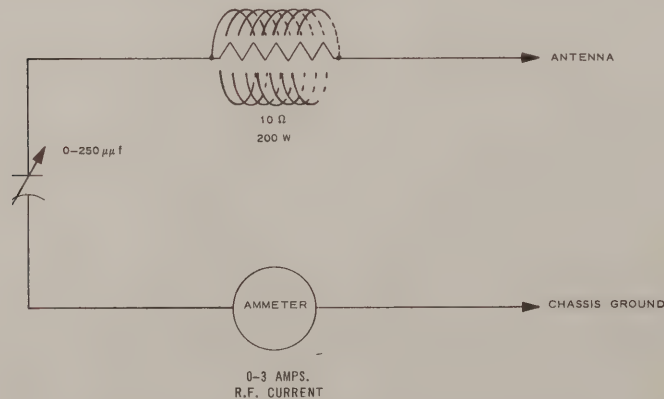


Figure 7. SCHEMATIC DIAGRAM, DUMMY ANTENNA



It is good preventive maintenance to make periodic checks on any type of radio equipment. The transmitting and power supply units of the SKIPPER CUSTOM "120" contain relays whose contacts may require a slight occasional cleaning. The cleaning should be done carefully with a strip of crocus cloth or a regular contact cleaning tool.

These simple checks, together with reasonable care, will assure you of long and dependable service from your Bendix SKIPPER CUSTOM "120".

## VI FEDERAL COMMUNICATIONS COMMISSION REGULATIONS

### 1. GENERAL

The operators of radiotelephone equipment should be familiar with Part 8 of the Federal Communications Commission Rules and Regulations. Remember, the primary function of marine communications' equipment is safety to life and property.

Operation of this equipment requires that the transmitter be licensed by the Federal Communications Commission and in addition, the operator must have a valid radiotelephone operator's license or permit.

As a reminder, the F.C.C. requires the operator to maintain watch on 2182 kc, to keep his transmissions brief, to maintain an adequate log, and to periodically check his transmitted frequency.

### 2. TECHNICAL INFORMATION FOR F.C.C. LICENSE APPLICATION

Model No. & Mfg. Rated Output	SKIPPER CUSTOM "120" (120 Watts Input)
Radio Stage Modulated	Final Amplifier
Guaranteed Tolerance of Emitted Frequency	.005%
Spurious & Harmonic Radiation Suppression	Individual pi-network circuits for each channel.
No. and Type Tubes in Final Radio Stage	2-6146 or 2-6159
Cathode Current in Final Radio Stage	200 MA
Plate Voltage of Final Radio Stage	620 Volts

## VI LIST OF MARINE FREQUENCIES

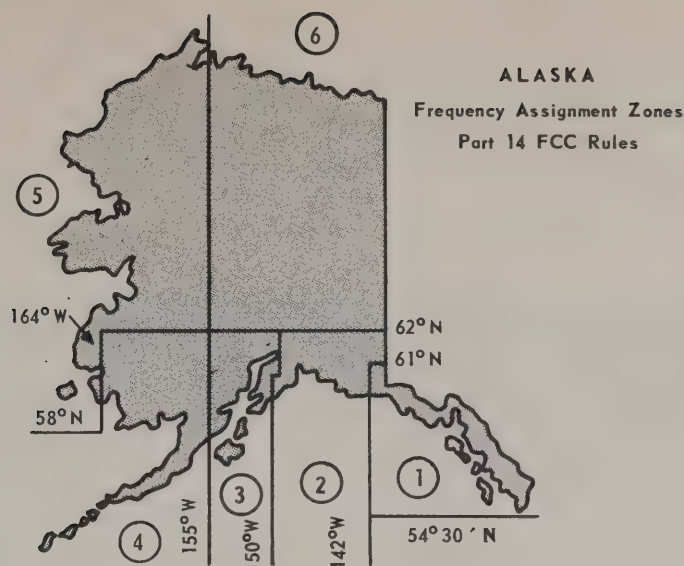
<u>U.S. EAST COAST</u>	Transmitting Frequency and Transmitter Crystal	Receiving Frequency	Receiver Crystal
	kc.	kc.	kc.
Boston, Channel 1	2406	2506	2961
Boston, Channel 2	2366	2450	2905
New York	2126	2522	2977
New York	2198	2590	3045
New York	2382	2482	2937
Wilmington, Delaware	2166	2558	3013
Chesapeake Canal, Delaware	2350	2350	2805
Baltimore, Maryland	2166	2558	3013
Norfolk, Virginia	2142	2538	2993
Charleston, South Carolina	2390	2566	3021
Jacksonville, Florida	2390	2566	3021
Miami, Florida (Day only)	2031.5	2490	2945
Miami, Florida	2118	2514	2969
Miami, Florida	4122.2	4427.6	3972.6
Tampa, Florida (Day only)	2009	2466	2921
Tampa, Florida	2158	2550	3005
Mobile, Alabama	2430	2572	3027
New Orleans, Louisiana	2206	2598	3053
New Orleans, Louisiana	2166	2558	3013
New Orleans, Louisiana	2382	2482	2937
Galveston, Texas	2134	2530	2935
Galveston, Texas	2366	2450	2905
Gulf of Mexico Area, Ship to Ship	2830	2830	3285
Mississippi River, Channel 5	2782	2782	3237
Mississippi River, Channel 1	4067	4067	3612
Mississippi River, Alternate, Channel 1	4372.4	4372.4	3917.4
San Juan, Puerto Rico	2134	2530	2985
Havana, Cuba	2760	2760	3215



	Transmitting Frequency and Transmitter Crystal	Receiving Frequency	Receiver Crystal
	kc.	kc.	kc.
<u>U.S. GREAT LAKE AREA</u>			
Calling and Coast Guard, Channel 51	2182	2182	2637
Telephone, Channel 39	2118	2514	2969
Telephone, Channel 30	2158	2550	3005
Ship to Ship, Channel 40	2003	2003	2458
Telephone, Channel 60	4115.3	4420.7	3965.7
Telephone, Channel 38	2206	2582	3037
Telephone, Channel 20	4129.1	4434.5	3979.5
<u>CANADIAN GREAT LAKES AREA</u>			
Ship to Ship	2003	2003	2458
Calling and Distress	2182	2182	2637
Telephone	2118	2514	2969
Telephone	2206	2558	3013
Telephone	4108.4	4413.8	3958.8
Ship to Ship, East of Montreal	2738	2738	3193
<u>CANADIAN EAST COAST</u>			
Telephone	2206	2582	3037
Ship to Ship	2134	2134	2589
Halifax, V.B.Q.	4108.4	4413.8	3958.8
Halifax, V.B.Q.	2206	2530	2985
Halifax Government	2206	2582	3037
<u>NEWFOUNDLAND AND LABRADOR</u>			
Coast Stations	2118	2514	2969
Coast Stations	2142	2538	2993
Coast Stations	2166	2538	2993
Coast Stations	2206	2582	3037
Ship to Ship	2134	2134	2589
Ship to Ship	2638	2638	3093

	Transmitting Frequency and Transmitter Crystal	Receiving Frequency, Receiver Crystal	
	kc.	kc.	kc.
<u>CANADIAN WEST COAST</u>			
Coast Stations	1630	1630	2085
Vancouver Fishing Boats, British Columbia	2015	2538	2993
Vancouver Tug Boats and Others	2142	2558	3013
Rupert Station, British Columbia	2166	2590	3045
Fishing Boats, Ship to Ship	2318	2318	2773
Ship to Ship	2366	2366	2821
N. W. Vancouver Telephone	4122.2	4427.6	3972.6
<u>U. S. WEST COAST</u>			
Seattle, Washington	2126	2522	2977
Seattle, Washington	2430	2482	2937
Astoria, Oregon	2206	2598	3053
Portland, Oregon	2009	2566	3021
Eureka, California	2406	2506	2961
San Francisco, California	2406	2506	2961
San Francisco, California	2003	2450	2905
San Francisco, 7 AM - 7 PM (PST)	2142	2538	2993
Los Angeles, California	2009	2566	3021
Los Angeles, 7 AM - 7 PM (PST)	2126	2522	2977
Los Angeles, 7 AM - 7 PM (PST)	2206	2598	3053
Honolulu, Hawaii (Day only)	2134	2530	2985
Hilo, Hawaii	2198	2582	3037
ALASKA and ALASKA ZONE			
Pacific Coast except Columbia River Primary (Ship to Ship)	2638	2638	3093
Columbia River Secondary (Ship to Ship)	2738	2738	3193
All Zones	1622	1622	2077
Zone 1, 4, 6	1646	1646	2101
Zone 2, 5	1652	1652	2107
Zone 3, 4	1708	1708	2163
Zone 1 (E of 138°), 5 (N of 62°)	1712	1712	2167
Zone 1 (7 AM - 11 PM) May 15 - Sept. 16 (8 AM - 9 PM) April 1 - May 15 (8 AM - 9 PM) Sept. 16 - Nov. 1 Local Standard Time	2006	2006	2461





ALASKA and ALASKA ZONE	Transmitting Frequency and Transmitting Crystal	Receiving Frequency	Receiver Crystal
Zone 2, 4	2118	2118	2573
All Zones	2182	2182	2637
All Zones (Ship to Ship)	2382	2382	2837
Zone 1, 3	2422	2422	2877
Zone 2, (N of 59° <sup>0</sup> , 6 AM - 11 PM) April 1 - Nov. 1 Local Standard Time	2430	2430	2885
Zone 3, 4, 6	2450	2450	2905
Zone 3 (6 AM - 11 PM) April 1 - Nov. 1 Local Standard Time	2482	2482	2937
Zone 5, 6 Non-interference basis	2506	2506	2961
Zone 1, 2, 3, 4	2512	2512	2967
Zone 2, 3 (N of 56° <sup>0</sup> only)	2538	2538	2993
Zone 1, 4, 5	2566	2566	3021
Zone 1 (7 AM - 11 PM) May 15 - Sept. 16 (8 AM - 9 PM) April 1 - May 15 Local Standard Time	2616	2616	3071
All Zones, ACS-Anchorage, Barrow, Petersburg, Seward and Sitka	2134	2312	2767
All Zones ACS-Ketchikan	2134	2300	2755
All Zones, Juneau, Kodiak, Nome	2134	2784	3239

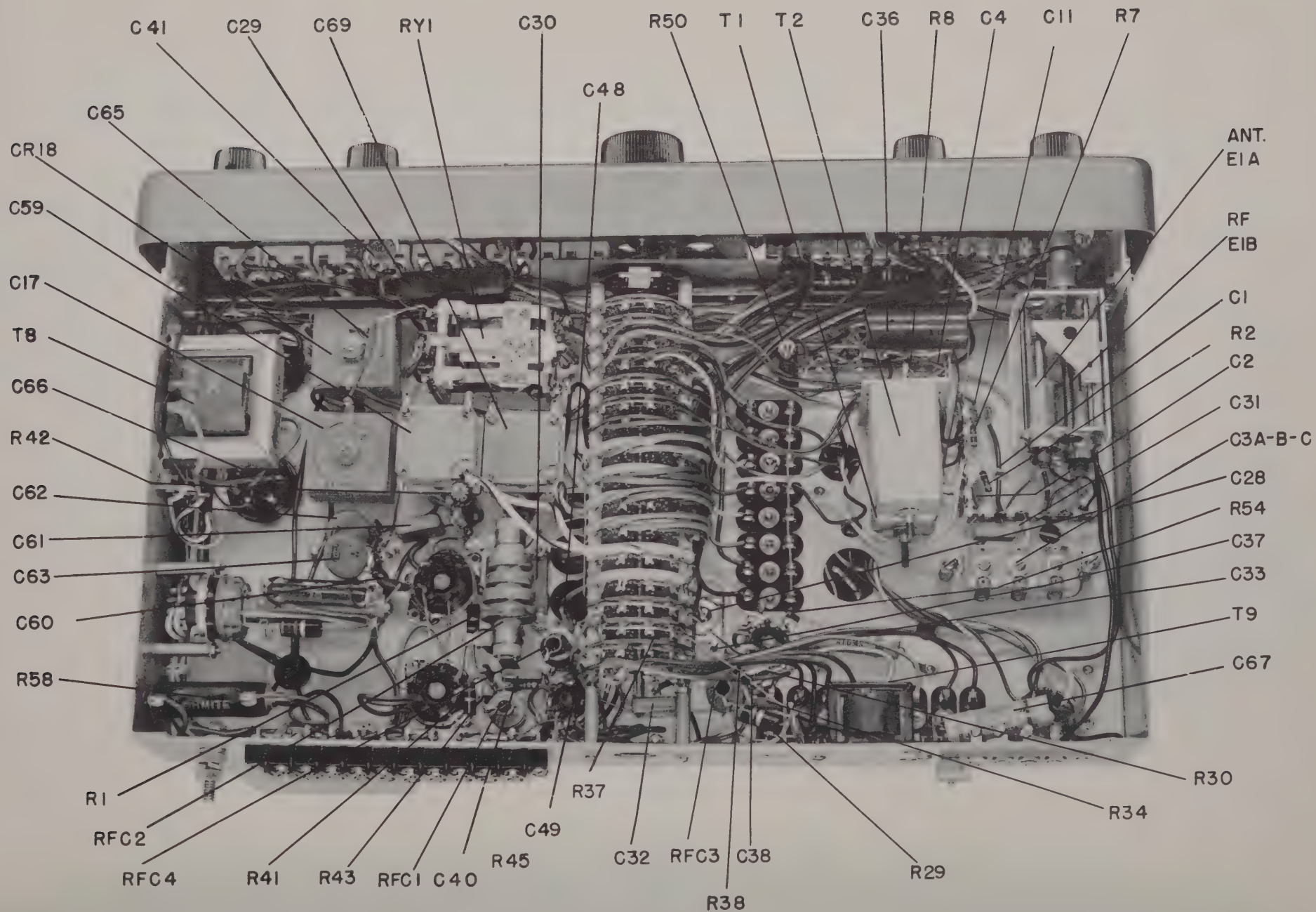


Figure 8. SKIPPER CUSTOM "120" BOTTOM VIEW



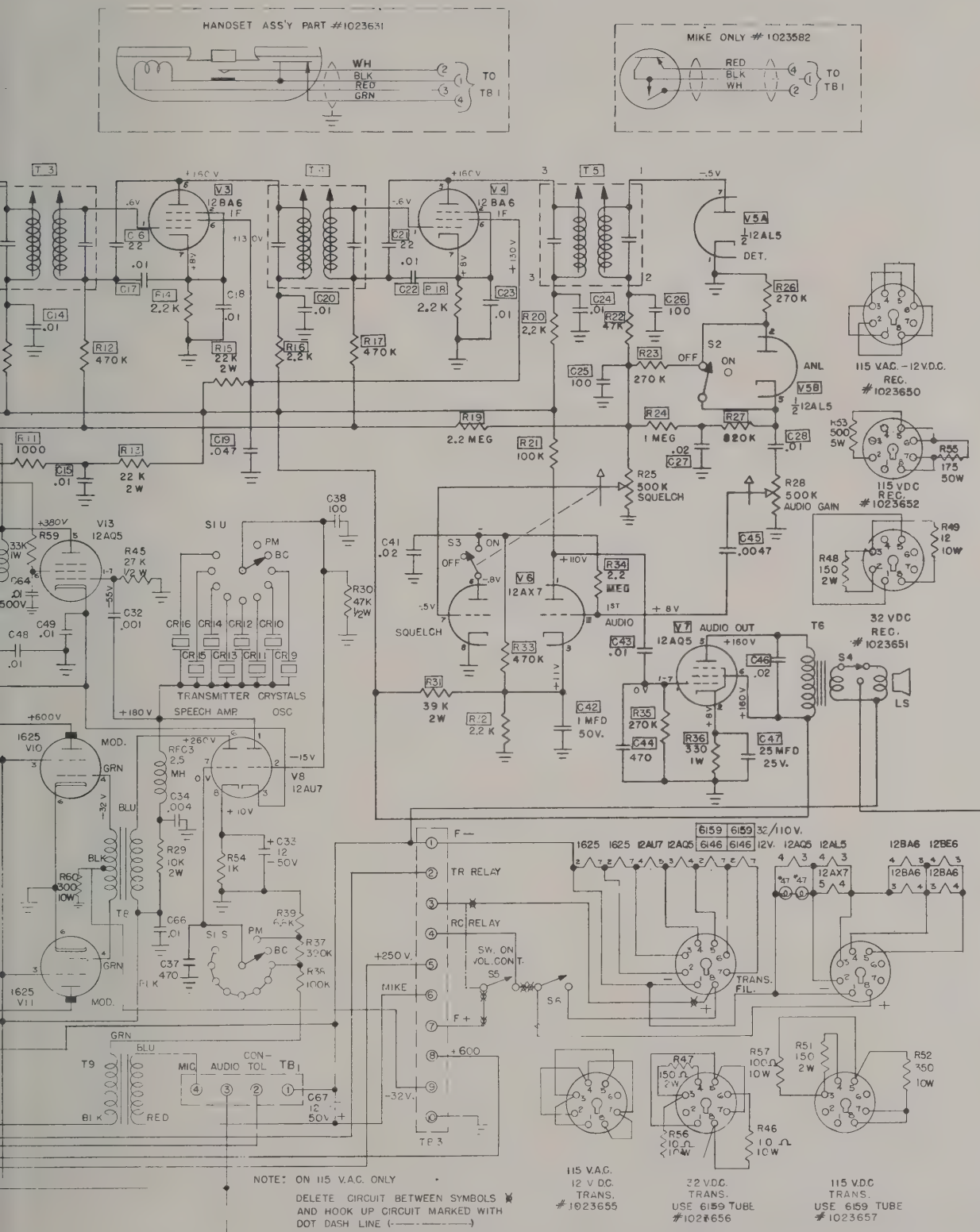


Figure 9. SCHEMATIC DIAGRAM, SKIPPER CUSTOM "120"

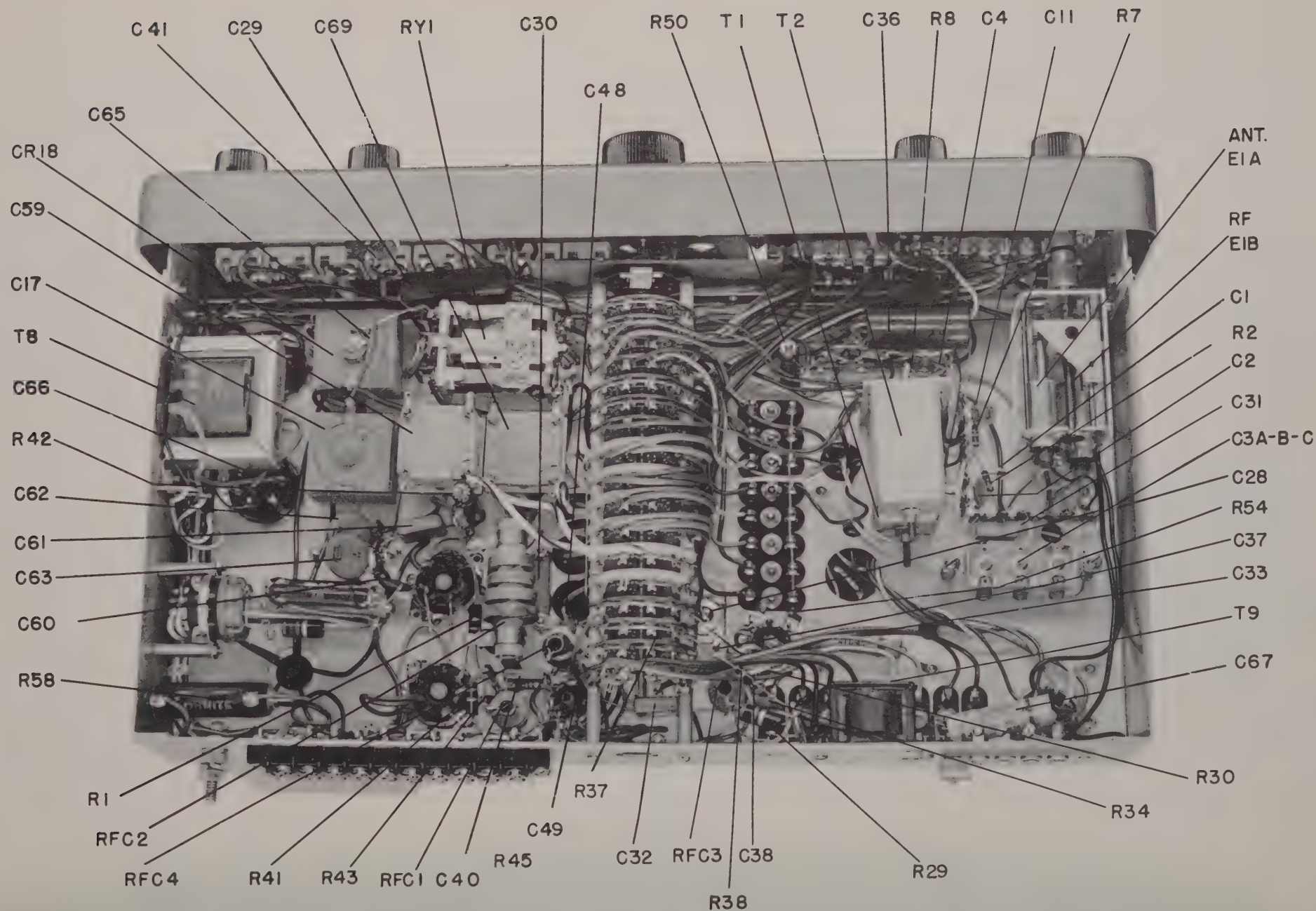


Figure 8. SKIPPER CUSTOM "120" BOTTOM VIEW



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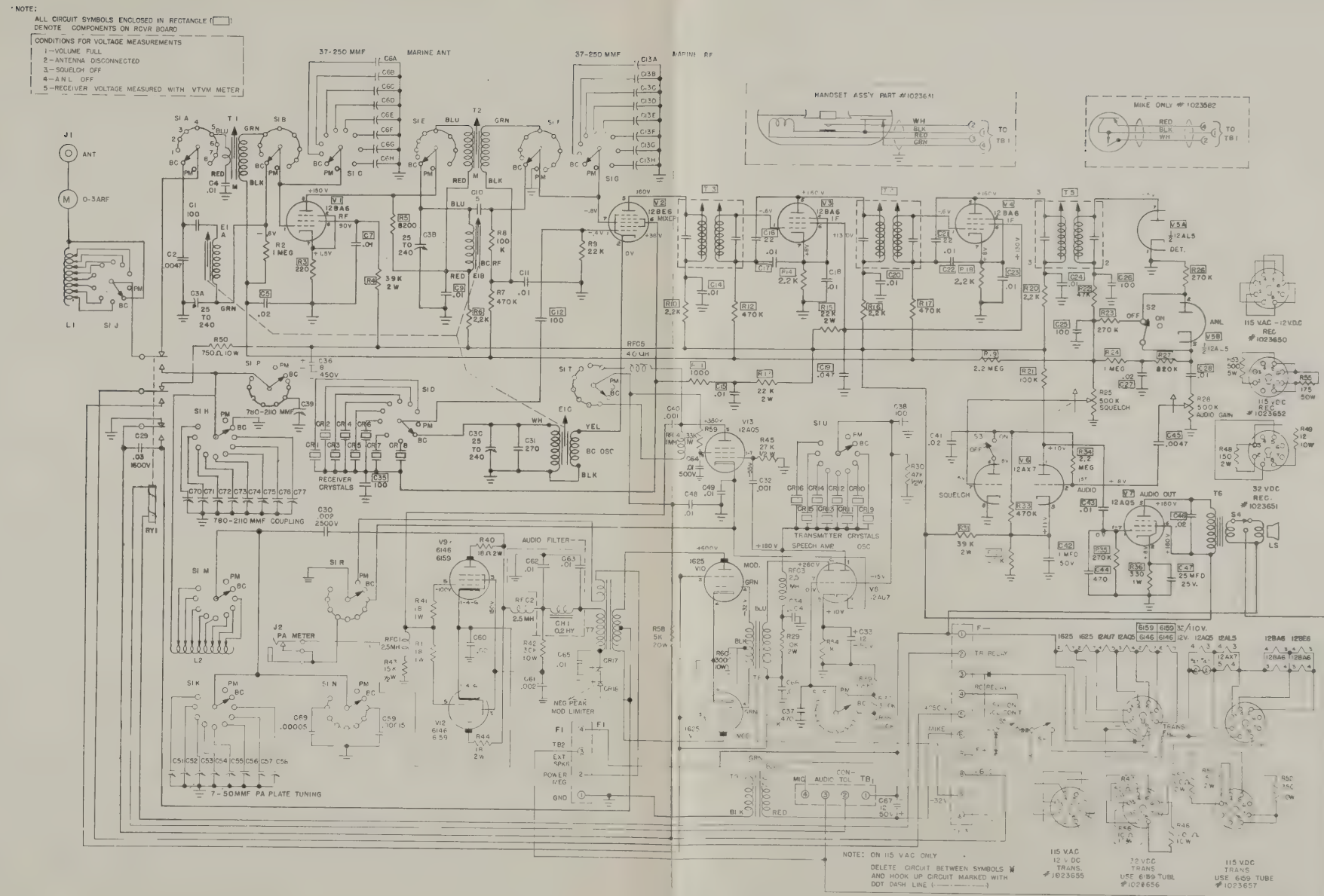


Figure 9. SCHEMATIC DIAGRAM, SKIPPER CUSTOM "120"





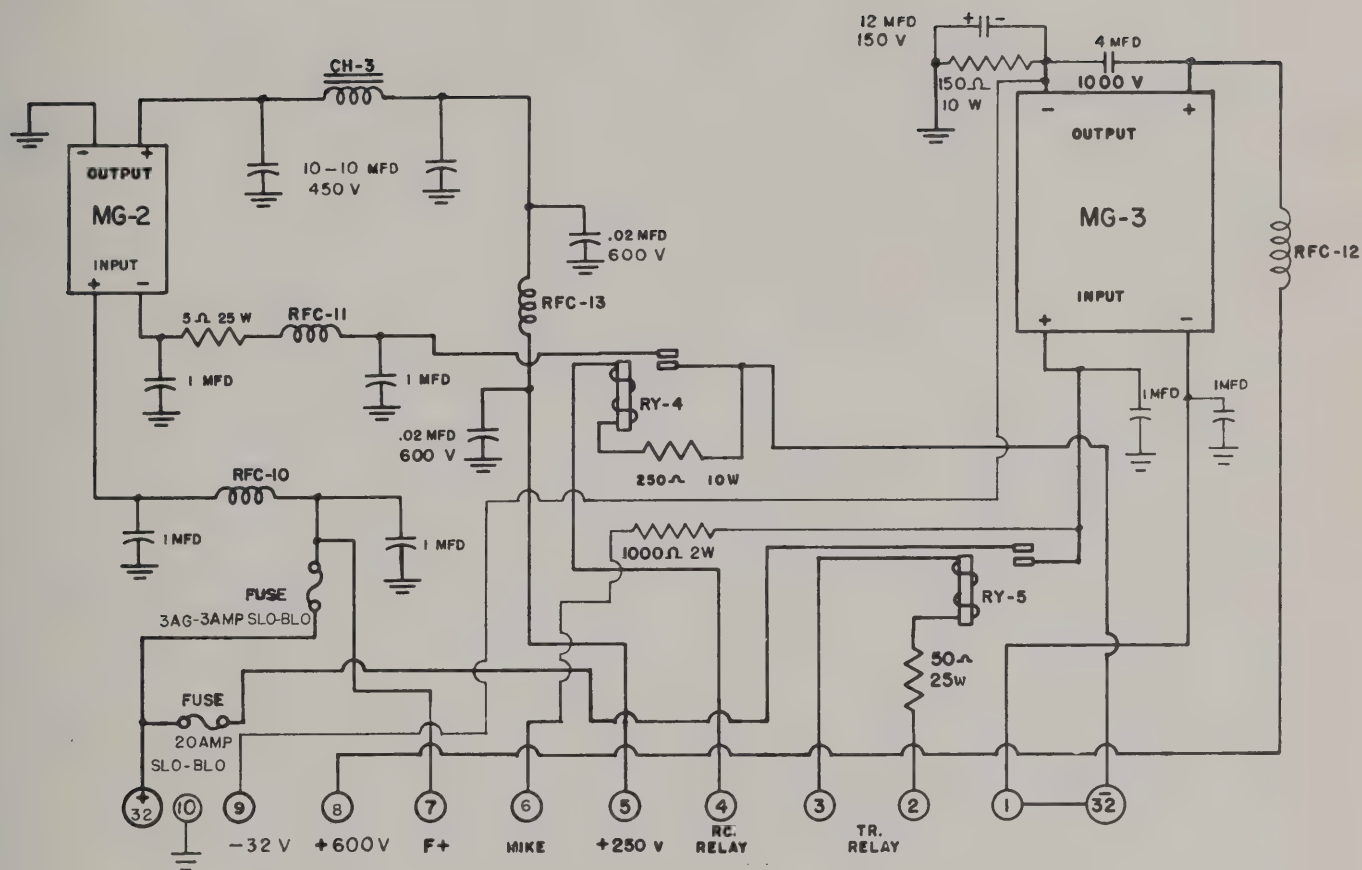


Figure 11. SCHEMATIC DIAGRAM, 32 VOLT DC POWER SUPPLY



REFERENCE SYMBOL	ITEM & DESCRIPTION	BENDIX PART NUMBER	COMPONENT MANUFACTURER
	Power Supply 12V DC	1023593	
CH-2	Filter Choke	1016778	Excel Transformer Co. No. 3586
MG-1	Dynamotor	1016981	Carter Motor Co. No. 6040BSM
RFC-6 RFC-7	R.F. Choke	1016780	Mallory No. 582
RFC-8 RFC-9	R.F. Choke	1016782	J. W. Miller 8971RF
RY-2	Receiver Relay	1016840	Leach Relay Co. No. 223
RY-3	Transmitter Relay	1016841	Leach Relay Co. No. 1091
T-10	Vibrator Transformer	1016837	R. M. Hadley Co. No. 9169
VIB-1	Vibrator	1016846	Mallory No. G-859
	Power Supply 32V DC	1023632	
CH-3	Filter Choke	1016778	Excel Transformer Co. No. 3586
MG-2	Dynamotor	1016977	Columbia Electronic Sales DM-32
MG-3	Dynamotor	1016982	Carter Motor Co. 6040 CSM
RFC-10 RFC-11	R. F. Choke	1016780	John E. Fast and Co. No. A8740BA
RFC-12 RFC-13	R. F. Choke	1016782	J. W. Miller 8971RF
RY-4	Receiver Relay	1016843	Leach Relay Co. SPDT-Type 223
RY-5	Transmit Relay	1016841	Leach Relay Co. No. 1091













POWER SUPPLY MAJOR COMPONENT LIST

REFERENCE SYMBOL	ITEM & DESCRIPTION	BENDIX PART NUMBER	COMPONENT MANUFACTURER
	Power Supply 115V AC	1023775	
CR-19	Selenium Rectifier	1017316	Federal Mfg. Co. Type 1017
L-3	Filter Choke	1016778	Excel Transformer Co. No. 3586
L-4	Filter Choke	1016779	Triad Transformer Co. No. C-21X
L-5	Filter Choke	1023800	Triad Transformer Co. No. C-18A
RY-6	Relay	1016841	Leach Relay Co. No. 1091
T-11	Power Transformer	1023805	Thordarson-Meissner Mfg. No. 22RO5
T-12	Filament Transformer	1023802	Triad Transformer Co. No. F-18X
T-13	Filament Transformer	1023803	Triad Transformer Co. No. F-25X
T-14	Filament Transformer	1023801	Triad Transformer Co. No. F-8X
T-15	Power Transformer	1023804	Thordarson-Meissner Mfg. No. 21P807
REFERENCE SYMBOL	ITEM & DESCRIPTION	BENDIX PART NUMBER	COMPONENT MANUFACTURER
	Power Supply 115V DC	1023633	
C-81A	Condenser	1016754	Sprague 10-10MFD 450Y
C-81B	Condenser	1017050	No. TVL2750 with metal plates
C-82 to C-87	Condenser	1017050	Aerovox Type R-354 1MFD
C-88	Condenser	1017054	Sagomo No. 33061Z .02MFD, 600V
C-89	Condenser	1017063	Sprague No. TVA 1407 12MFD, 150V
C-90	Condenser	1017049	National Capacitor No. NL-70-4A10 4MFD, 1000V
CH-4	Filter Choke	1016778	Excel Transformer Co. No. 3586
F-1	Fuse	561514-29	Littlefuse No. 313.010
F-2	Fuse	561514-31	Littlefuse No. 313.020
MG-4	Dynamotor	1023809	Carter Motor Co. No. 251013
MG-5	Dynamotor	1016985	Carter Motor Co. No. 6050 DSM
R-80	Resistor	1017228	Ohmite Brown Devil - 3000 10 watt
R-81	Resistor	1017232	Ohmite Brown Devil - 4000 10 watt
R-82	Resistor	1017034	Ohmite Brown Devil - 150 10 watt
R-83	Resistor	1023813	Ward Leonard Type 50A
RFC-13	R.F. Choke	1016780	John E. Fast and Co. No. A8740BA
RFC-14	R.F. Choke	1016782	J. W. Miller No. 8971 RF
RFC-15	R.F. Choke	1016782	J. W. Miller No. 8971 RF
RFC-16	R.F. Choke	1016782	J. W. Miller No. 8971 RF
RY-6	Receiver Relay	1016843	Leach Relay Type 223 with 6 volt coil
RY-7	Transmitter Relay	1023810	Leach Relay No. 1091 with 110 volt coil

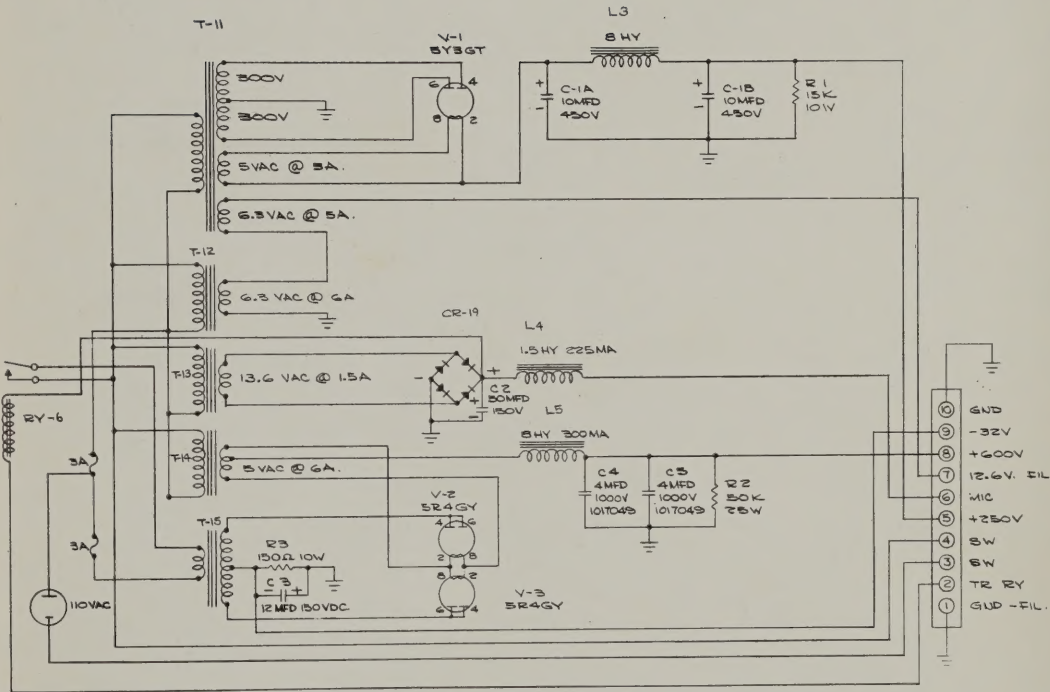


Figure 12. SCHEMATIC DIAGRAM, 115V AC POWER SUPPLY

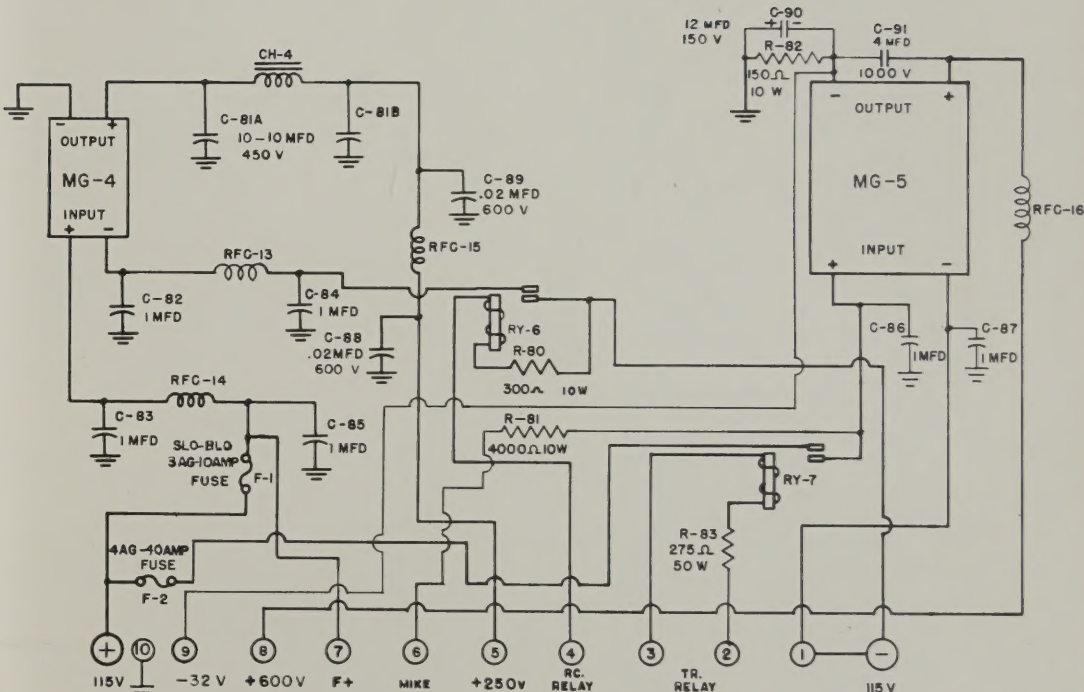


Figure 13. SCHEMATIC DIAGRAM, 115V DC POWER SUPPLY









